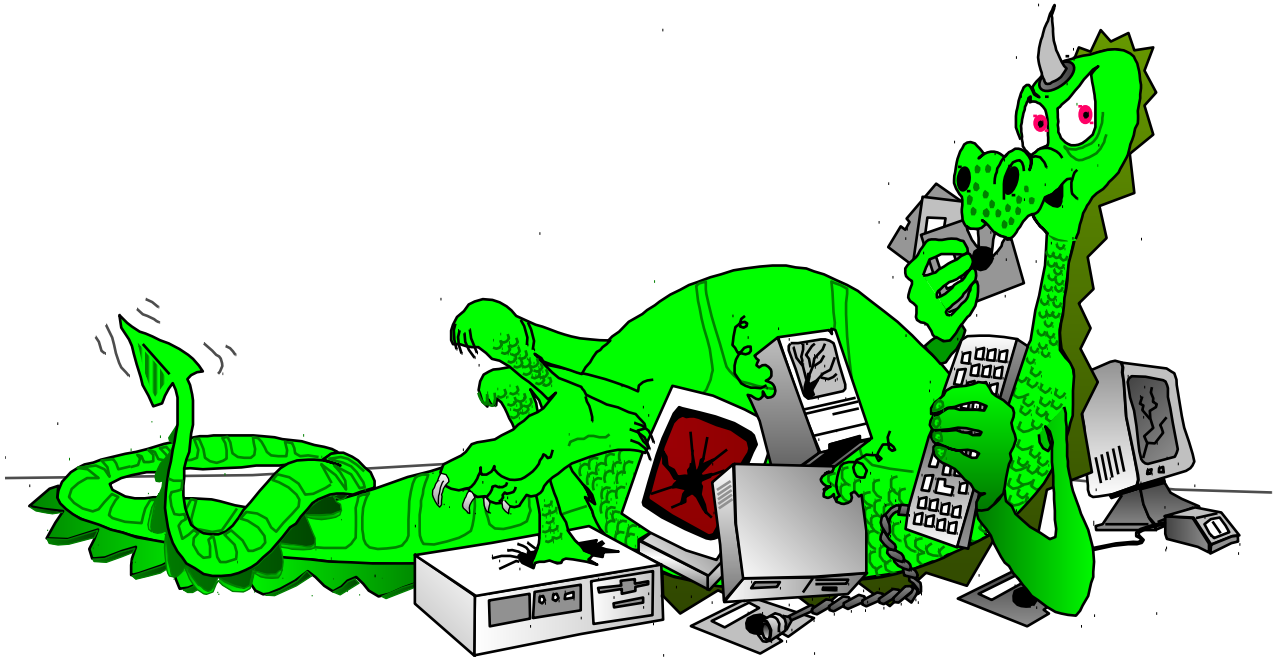
SAM Executive Semina

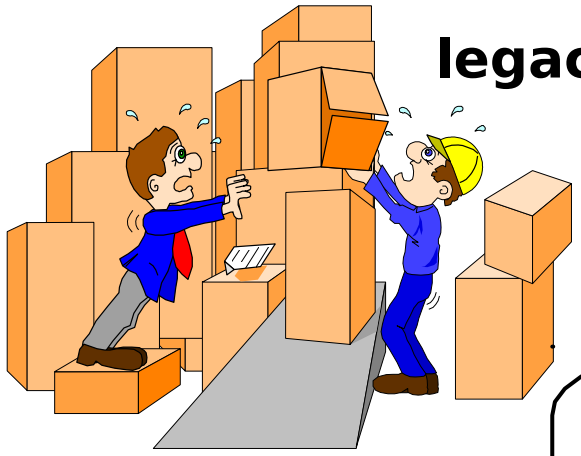


COTS-Based Systems*

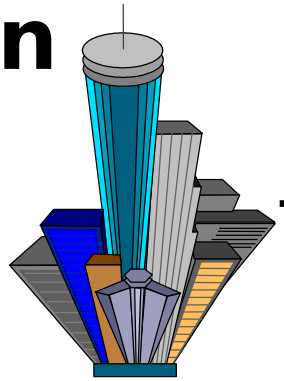
George Prosnik
DAU CDSC E&T Center

* Derived from the SEI's CBS for Executives materials as modified for Defense Systems Management College (DSMC) Instruction

COTS: Attraction and Motivation

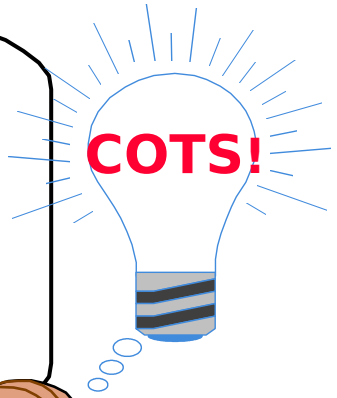


legacy systems



demands for more functionality

- develop faster
- adopt best commercial practices
- leverage commercial investment
- leverage new technology
- reduce costs

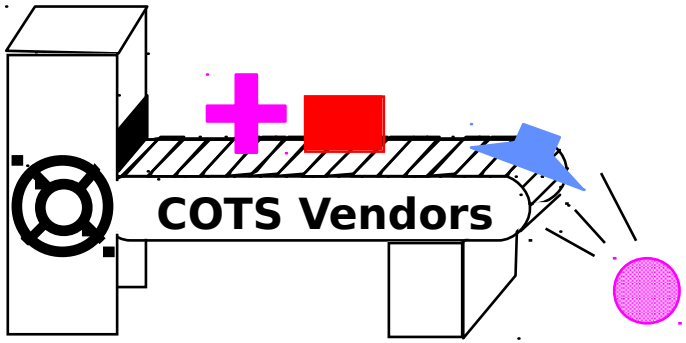


What is COTS?

A COTS product is a product

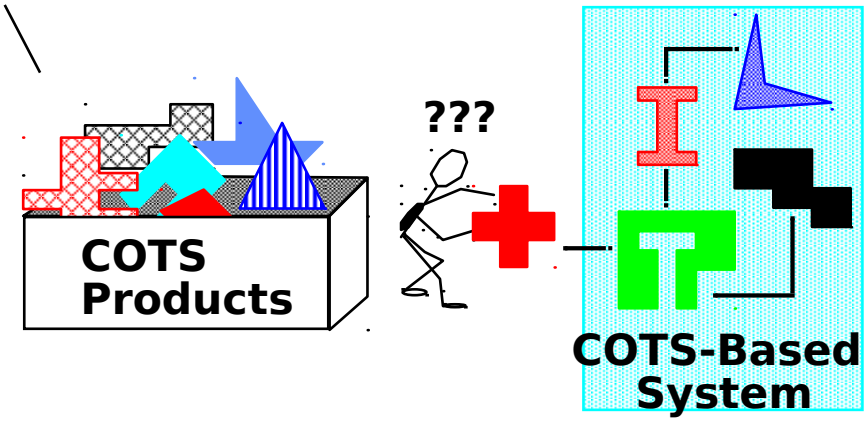
- **sold, leased, or licensed to the general public**
- **offered by a vendor trying to profit from it**
- **supported and evolved by the vendor, who retains the intellectual property rights**
- **available in multiple, identical copies**
- **used without modification of the internals**

What Makes CBS Challenging?



- **Built-in assumptions of end-user processes that may not match yours**
- **Licensing, data rights, warranties**

- **Frequent, continuous change of COTS products and marketplace**
- **COTS products driven by marketplace, not your system context**



What Makes CBS Challenging?

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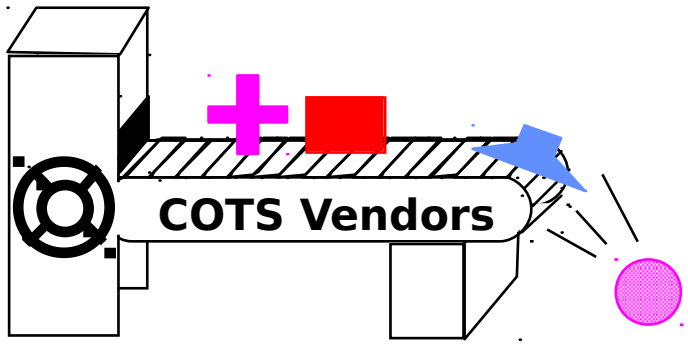
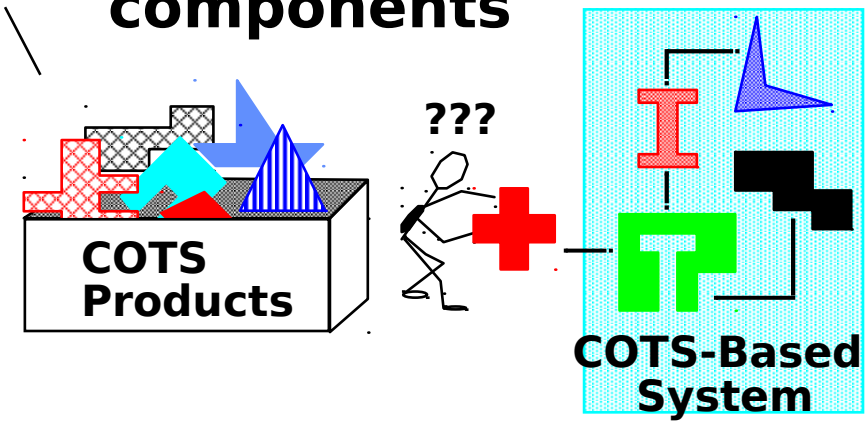


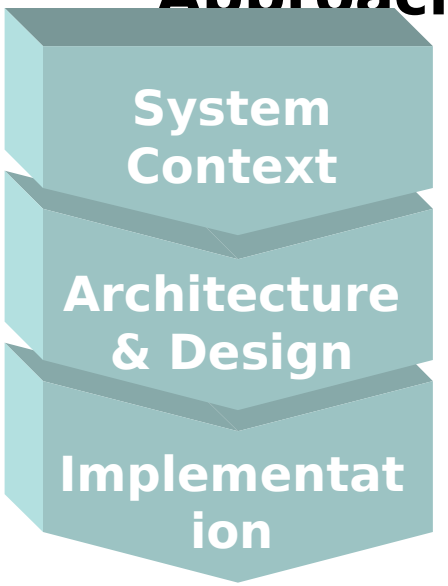
- **Varying architectural paradigms across system components**
- **Dependencies among system components**

- **Limited control of frequency or content of COTS releases**
- **Limited visibility into COTS product internals and behavior**

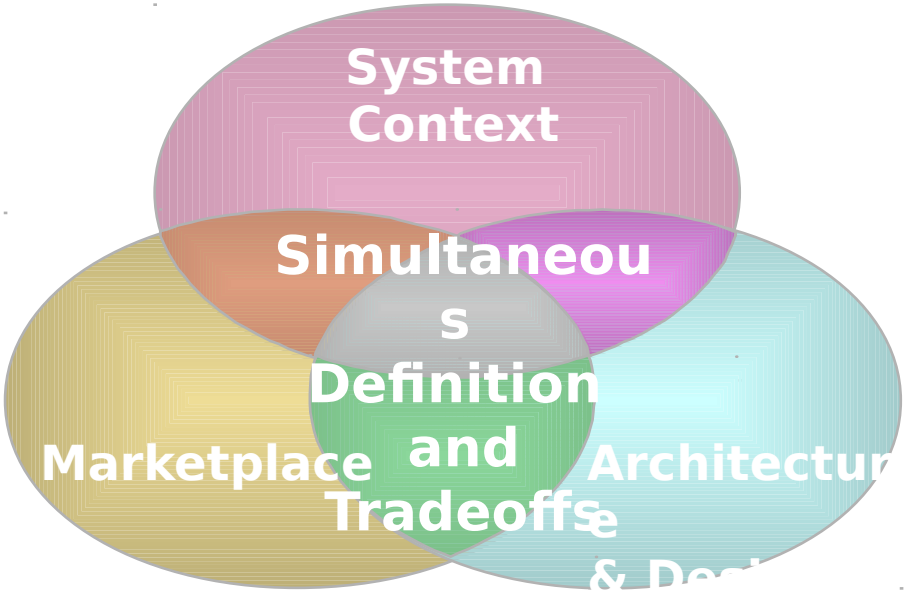


CBS Fundamental Process Changes

Traditional Development Approach



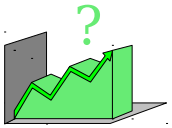
Required COTS Approach



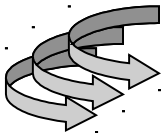
This change applies to *business* and *contractual* activities, as well as the *engineering* ones.

Keys to CBS Success

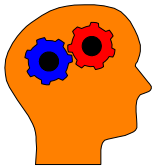
- Make COTS-Based System Tradeoffs



- Think More Like a Business



- Establish Evolution as a Way of Life



- Change the Culture

Keys to CBS Success

- ***Make COTS-Based System Tradeoffs***
  - ***Reconcile Products and User Operations***
  - ***Leverage the Marketplace***
  - ***Engineer an Evolvable Architecture***
  - ***Make Tradeoffs Simultaneously***
  - ***Avoid COTS Modification***
- **Think More Like a Business**
- **Establish Evolution as a Way of Life**
- **Change the Culture**

User Operations/Product Mismatch Actions

- ***Program Manager actions:***
  - **identify end-user processes and product mismatches early**
  - **involve end-users and other stakeholders early**
  - **negotiate system context and product tradeoffs**
  - **use domain experts and consultants from the COTS products' suppliers**
  - **use prototypes and pilots to gain product insight**

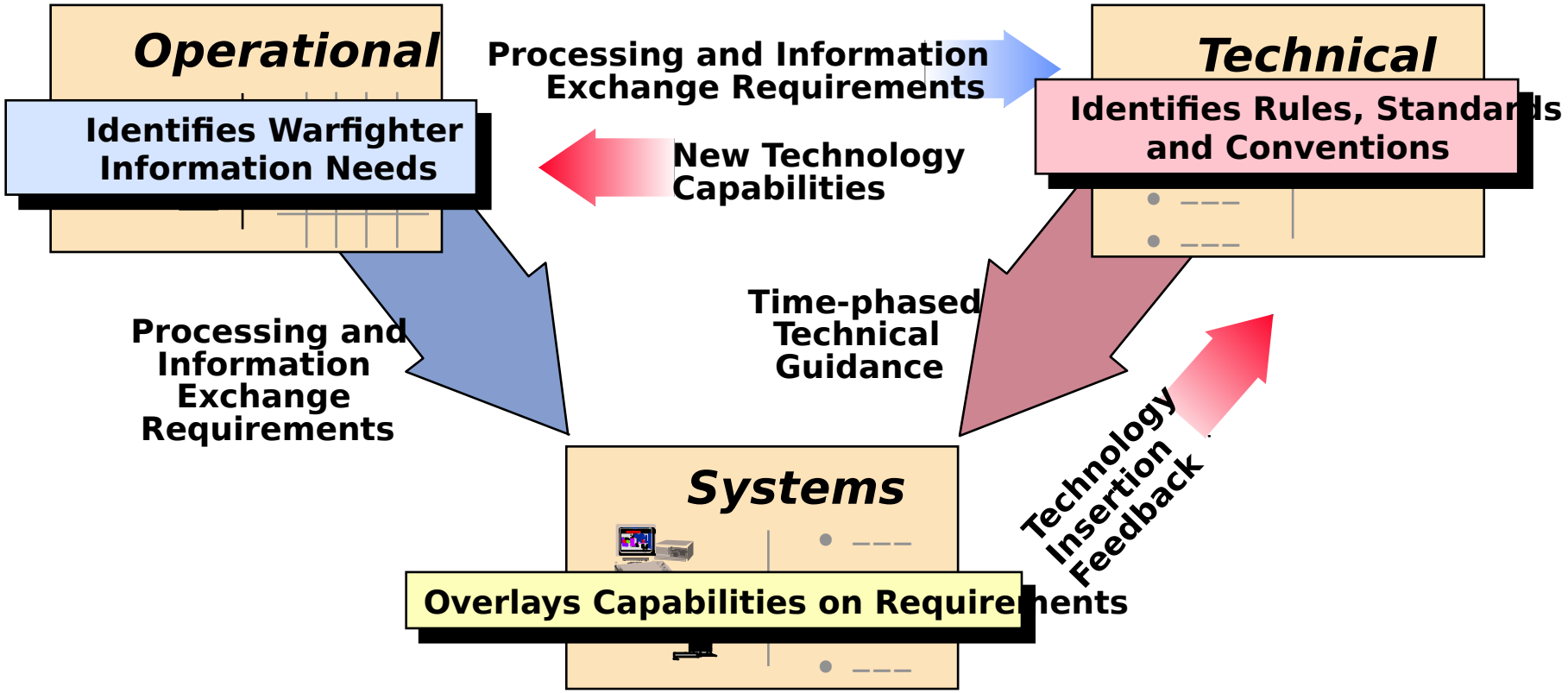
- ***Executive support:***
  - **facilitate negotiation to reconcile mismatch between products and end-user processes**

Marketplace Actions

- ***Program Manager actions:***
  - participate in user and industry groups
  - maintain government and contractor marketplace knowledge
  - keep current with the marketplace
  - evaluate products and suppliers
  - use testbeds/prototypes throughout the life cycle
  - allocate sufficient resources for marketplace activities

- ***Executive support:***
  - establish
    - » an information sharing structure
    - » marketplace watch groups
    - » organization-wide testbeds
    - » example evaluation criteria and plans
    - » technology refresh guidelines

An Example of an Architecture Framework



Information Technology Architecture: An integrated framework for evolving or maintaining existing information technology and acquiring new information technology to achieve the agency's strategic goals and information resources management goals

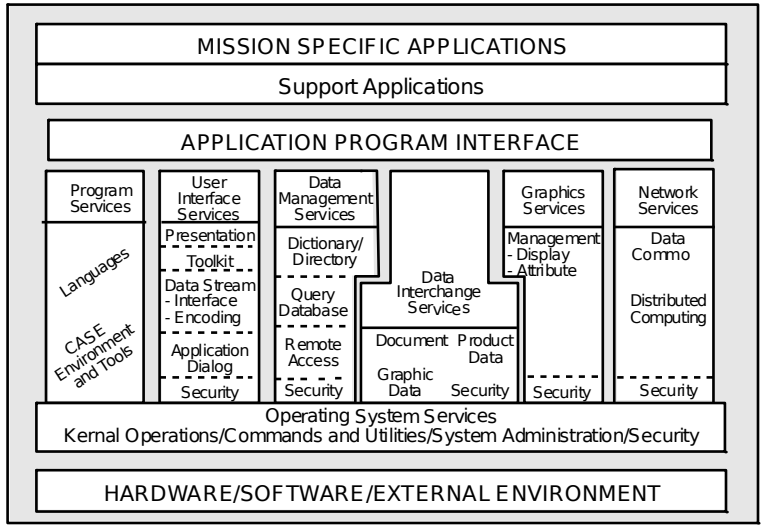
Open Architectures

The Universe of Software & System Architectures

Standards-Based Architectures

<u>Open</u> <u>Systems</u>: are those that enable properly engineered applications to be *ported* across many systems, to be able to *interoperate* with other applications on local and remote systems, and to interact with users in a style that facilitates *user portability*."

IEEE POSIX Standard 1003.0

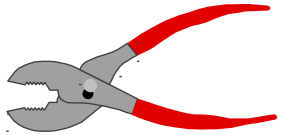


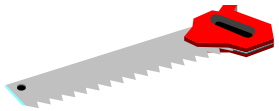
Rev 7.1

Avoid COTS Modification

- **Temptations for COTS product changes:**
  - **inability to change end-user processes**
  - **tailoring required for any use**
  - **work required to integrate**

- **Modification choices:**
  - **non-surgical tailoring**
  - **surgical modification**





- **Or…don’t use COTS: do custom development.**

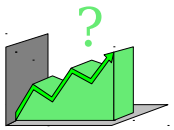
Part of the COTS paradigm is all about giving up control

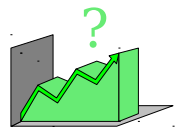
Actions to Avoid Modifications

- ***Program Manager actions:***
  - weigh modification choices carefully
  - acknowledge and accommodate the consequences of COTS product modification
  - get vendor commitment to incorporate modifications into the next version of the commercial product
  - pay attention to the economics of tailoring
- ***Executive support:***
  - demand extensive justification of (proposed) COTS surgical modifications

Keys to CBS Success

- Make COTS-Based System Tradeoffs
- ***Think More Like a Business***
  - ***Live by the COTS Business Case***
  - ***Negotiate Licenses & Supplier Relationships***
  - ***Realign Budgets for COTS Realities***
- Establish Evolution as a Way of Life
- Change the Culture

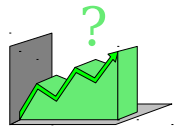




Licenses and Supplier Relationship Actions

- ***Program Manager actions:***
  - develop strategies to create and manage vendor and supplier relationships
  - negotiate licenses
  - look for volume discounts
  - obtain licenses that transfer to the government/maintainers
  - create government partnerships with critical second-tier vendors

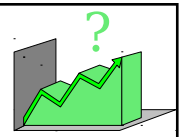
- ***Executive support:***
  - watch for enterprise license opportunities



Realign Budgets for COTS Realities

- **Accommodate marketplace volatilities**
  - **product upgrades, cascading upgrades, end of technology life**
  - **product feature reduction or bloat, vendor demise, changes to license arrangements**
- **Accommodate COTS infrastructure**
  - **technology and market watch**
  - **testbeds**
  - **culture change and training**
  - **information collection and dissemination**
  - **guidance, examples, handbooks**
  - **incentives**

COTS Budget Realignment Actions

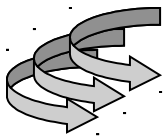


- ***Program Manager actions:***
  - budget for COTS cultural changes (government/contractor)
  - budget for new or increased costs
    - » technology forecasting
    - » continuous market research
    - » continuous evaluation
    - » reacting to new product releases
    - » reacting to marketplace changes
    - » engineering an evolvable architecture
    - » (re)integration
    - » licensing, warranties, data rights
  - estimate life-cycle costs realistically

- ***Executive support:***
  - budget for the organization's COTS cultural changes
  - budget for the organization's COTS infrastructure

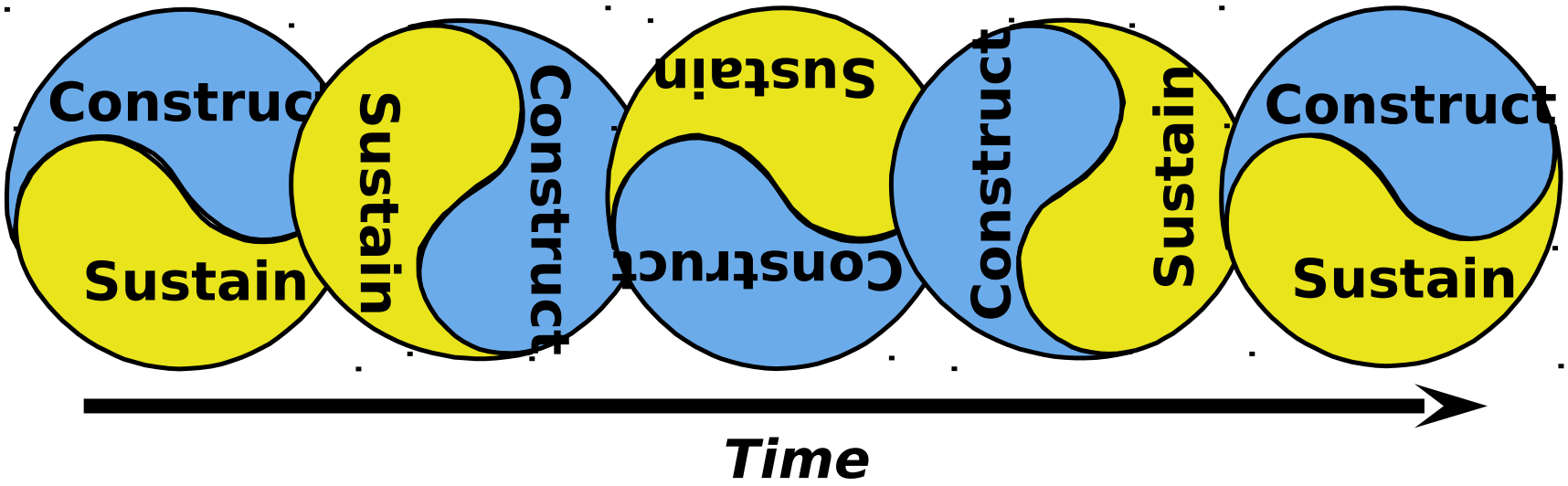
Keys to CBS Success

- Make COTS-Based System Tradeoffs
- Think More Like a Business
- ***Establish Evolution as a Way of Life***
  - ***Evolve COTS-Based Systems Continuously***
  - ***Take the Long View on System Acquisition***
- Change the Culture

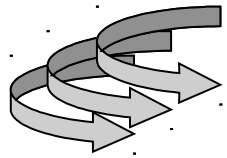


CBS Construction & Sustainment Merge

Marketplace Dynamics

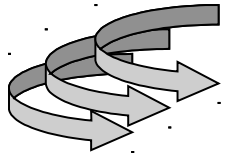


Evolution Actions



- ***Program Manager actions:***
  - use early system prototyping to validate product or technology feasibility
  - use prototypes and testbeds repeatedly in response to marketplace events
  - balance system instability with marketplace obsolescence
  - synchronize marketplace changes with system releases
  - budget sufficient resources for evolutionary activities
- ***Executive support:***
  - allocate resources for COTS migration and transition services
  - require collection of cost/resource data associated with migration and evolution
  - establish product characterization guidelines
  - establish evolution guidelines

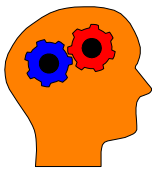
Take a Long View on System Acquisition



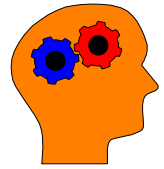
- **COTS-based systems: a *long-term commitment***
  - **both strategic and technological**
  - **benefit may only be realized in the mid/long term**
- **Strive for**
  - **long-term viability of acquisition strategy**
  - **stability of funding**
  - **flexibility of contract vehicles**
  - **long-term relationships in the marketplace/contractor community**
- ***Short-term tactics can scuttle long-term strategy.***

Keys to CBS Success

- Make COTS-Based System Tradeoffs
- Think More Like a Business



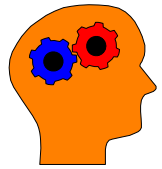
- Establish Evolution as a Way of Life
- ***Change the Culture***



Change the Culture

- **Who changes? - *everyone***
  - government (e.g., executives, program offices, procurement staff)
  - contractors
  - end users and other key stakeholders
- **What changes?**
  - how you *think* about your business activities
  - how you *execute* your business activities
  - how your *reward structure* operates
  - how your *organization* is structured and operates

Cultural Change Actions



- ***Program Manager actions:***
  - educate and train personnel in new skills for COTS-based systems
  - involve qualified government personnel to evaluate contractor COTS decisions and recommendations
  - capture, share, and apply COTS-based system lessons learned and metrics

- **Executive support:**
  - demand creation and delivery of COTS-based systems training from defense-related sources
  - ensure all personnel are trained
  - facilitate and incentivize the government and contractor cultural shift

Elephant Bungee Wisdom

Universal Truth #9: COTS are not necessarily the best solution. They bring risks + benefits… understand both!

Management Emphasis

- Investigate the pricing structure
- Select established products with large installed bases
- Budget for the complete cost of COTS integration and maintenance
- "Fly before you buy" + TEST a lot
- Adapt your requirements to COTS

Elephant Bungee Jumping #9: Avoiding Diseases that Are Fun to Catch